CLAIMS

1. A recording medium in which an application, a digital stream, and management information are recorded, wherein

the application is a program that is written in a programming language for a virtual machine,

a life cycle during which the application can be executed by the virtual machine is specified, and

the management information indicates a playback control of the digital stream that is performed during the life cycle simultaneously with the execution of the application.

2. The recording medium of Claim 1 in which a plurality of pieces of play list information, which define playback paths of the digital stream, are further recorded, wherein

the playback control indicated by the management information is to play back the digital stream in accordance with a playback path that is indicated by a piece of play list information to which a predetermined playback attribute has been attached.

3. The recording medium of Claim 2, wherein

the predetermined playback attribute is an attribute indicating that a playback is automatically started in accordance with the playback path that is indicated by the piece of play list information, and

the playback of the digital stream is performed simultaneously with the execution of the application when the playback attribute indicating that the playback is automatically started is attached to the piece of play list information.

4. The recording medium of Claim 2 in which a title unboundary application that has no life cycle is further recorded, wherein

the title unboundary application performs a process of selecting one piece of play list information from the plurality of pieces of play list information recorded in the recording medium in accordance with a value stored in a status register of a playback apparatus, and

the predetermined playback attribute is an attribute indicating that a playback is started after the selection of one piece of play list information by the title unboundary application.

5. The recording medium of Claim 1, wherein

the management information further includes a continuous playback flag that defines a recovery process that is to be performed when the application terminates abnormally, and

the continuous playback flag, when set to a predetermined value, indicates that the playback of the digital stream performed simultaneously with the execution of the application is continued after the application terminates abnormally.

6. The recording medium of Claim 1, wherein

the management information further includes a flag that defines a recovery process that is performed when the application terminates abnormally, and

the flag is classified into:

a flag (i) that indicates whether or not the application is restarted after the application terminates abnormally;

a flag (ii) that indicates an event that is output when

the application terminates abnormally; and

a flag (iii) that indicates whether or not a playback apparatus is rebooted.

5   7.   The recording medium of Claim 1 in which a plurality of applications are recorded, wherein

each of the plurality of applications belongs to any of a plurality of titles, and

a life cycle of each application is represented using a
10 title.

8.   A playback apparatus, comprising:

a virtual machine unit operable to execute an application that is recorded in a recording medium;

15   a playback control engine unit operable to playback a digital stream that is recorded in the recording medium; and

an application manager operable to cause the virtual machine unit to execute the application when a life cycle of the application is reached, and at a same time, to cause the playback control
20 engine unit to play back the digital stream in accordance with management information that is recorded in the recording medium.

9.   The playback apparatus of Claim 8, wherein

a playback control performed by the application manager
25 includes a control that causes the playback control engine unit to output a composite image that is composed of: an execution image of the application as a parent screen; and a playback image of the digital stream as a child screen.

10.   The playback apparatus of Claim 9, wherein

the application manager performs a control that causes the playback control engine unit to play back the playback image of the digital stream as a main image during a start-up delay until the application gets into an operation status, and

causes the playback control engine unit to display the composite image after the application normally gets into the operation status.

11.   The playback apparatus of Claim 10, wherein

the application manager further performs a control that causes the playback control engine unit to play back the playback image of the digital stream as the main image when a start-up failure or an abnormal termination of the application occurs.

12.   The playback apparatus of Claim 8, wherein

a plurality of pieces of play list information, which define playback paths of the digital stream, are recorded in the recording medium, and

the playback control performed by the application manager is to play back the digital stream in accordance with a playback path that is indicated by a piece of play list information to which a predetermined playback attribute has been attached.

13.   The playback apparatus of Claim 12, wherein

the predetermined playback attribute is an attribute indicating that a playback is automatically started in accordance with the playback path that is indicated by the piece of play list information.

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14. The playback apparatus of Claim 12, wherein

   a title unboundary application that has no life cycle is further recorded in the recording medium, wherein

   the title unboundary application performs a process of selecting one piece of play list information from the plurality of pieces of play list information recorded in the recording medium in accordance with a value stored in a status register of the playback apparatus,

   the predetermined playback attribute is an attribute indicating that a playback is started after the selection of one piece of play list information by the title unboundary application, and

   the playback of the digital stream by the playback control engine unit is performed in accordance with a piece of play list information to which the predetermined playback attribute is attached and that is selected by the title unboundary application.

15. The playback apparatus of Claim 8, wherein

   the management information further includes a continuous playback flag that defines a recovery process that is to be performed when the application terminates abnormally, and

   the application manager further judges whether or not the continuous playback flag has been set to a predetermined value, and if the continuous playback flag has been set to the predetermined value, causes the playback control engine unit to continue the playback of the digital stream simultaneously with the execution of the application after the application terminates abnormally.

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16.   The playback apparatus of Claim 8, wherein

the life cycle of the application is indicated by management information that is recorded in the recording medium,

5   the management information further includes a flag that defines a recovery process that is performed when the application terminates abnormally, and

the application manager performs, in accordance with the flag in the management information, one of:

10   a control (1) that restarts the application after the application terminates abnormally;

a control (2) that outputs a predetermined event; and

a control (3) that reboots the playback apparatus.

15   17.   The playback apparatus of Claim 8 comprising

a permission controller operable to perform authentication of the application if the application instructs a playback specifying a piece of play list information, wherein

the playback control engine unit performs the instructed

20   playback in accordance with the specified piece of play list information if the permission controller certifies authenticity of the application through the authentication.

18.   The playback apparatus of Claim 8, wherein

25   if the application is to perform a playback in accordance with play list information, the application manager determines a piece of play list information that can be played back by the application, and notifies the application of the determined piece of play list information, and

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the playback control engine unit performs the playback in accordance with the notified piece of play list information.

19.   A program that is read into a computer that includes a virtual machine unit operable to execute an application that is recorded in a recording medium, and a playback control engine unit operable to play back a digital stream that is recorded in the recording medium, the program causing the computer to execute the steps of:

causing the virtual machine unit to execute the application when a life cycle of the application is reached, and at the same time

causing the playback control engine unit to play back the digital stream in accordance with management information that is recorded in the recording medium.

20.   A playback method for a computer that includes a virtual machine unit operable to execute an application that is recorded in a recording medium, and a playback control engine unit operable to play back a digital stream that is recorded in the recording medium, the playback method causing the computer to execute the steps of:

causing the virtual machine unit to execute the application when a life cycle of the application is reached, and at the same time

causing the playback control engine unit to play back the digital stream in accordance with management information that is recorded in the recording medium.

21. A system integrated circuit that is embedded into a playback apparatus that plays back a digital stream, the system integrated circuit comprising:

a virtual machine unit operable to execute an application

5   that is recorded in a recording medium; and

an application manager operable to cause the virtual machine unit to execute the application when a life cycle of the application is reached, and at a same time, to cause the playback control engine unit to play back the digital stream in accordance with

10   management information that is recorded in the recording medium.